Programme Specific Outcomes,

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Course Outcomes of B.Sc.

Department of Mathematics

Academic Year

2021-22

Programme Specific Outcomes: B.Sc. Subject (Programme code)

Name of the Department : Subject	
Program Specific Outcomes	
At the end of the programme, student will be able to	
1	Draw graph of various real valued functions occuring in nature
2	Identify, modify and apply the mathematical model in the real life problem
3	Will enlight the career in Industrial Mathematics and Software Designing
4	Can apply various mathematical methods to solve basic problems in nature
5	Apply the mathematical logic towards mathematical programming
6	Can work effectively in the group to solve basic mathematical models

Course Outcomes: B.A. Subject (Programme code)

	Class : F.Y.B.Sc	
	Semester-I	
Paper	**Course code & course title**	**At the end of the course, student will be able to**
I	Algebra (MT111)	**CO1**: Explain basic properties of Algebra
		CO2: Discuss the statements of theorems and Differentiate between properties of Real Numbers and Complex Numbers
		CO3: Solve problems of calculating gcd of two numbers, remainder using congruence properties
		CO4: Analyze algebraic properties of integers
		CO5: Estimate roots of Complex Numbers and n^{th} Roots of unity.
		CO6: Design Maxima program related to the problem of Congruence theory and Divisibility.
II	Calculus- I (MT112)	**CO1:** Explain basic properties of various topics in calculus
		CO2: Discuss the results of Algebraic Properties of Real Numbers
		CO3: Solve example on Real numbers, Sequences, Limits and Continuity
		CO4: Draw the graph of some function
		CO5: Discuss the limit and continuity of Real valued Functions
		CO6: Design Maxima Software program related to Calculus
III	Mathematics Practical (MT 113)	**CO1:** Understand the knowledge of basic properties of numbers
		CO2 : Discuss the reminder properties using various Algorithm
		CO3 : Understand the geometry of imaginary numbers
		CO4 : Discuss difference between limit and continuity
		CO5 : Understand properties of Sequence and Series
		CO6: Solve various exercise using Maxima Software
	Semester-II	
I	Analytical Geometry (MT 121)	**CO1:** Define basic concepts in 3 - dimensional geometry
		CO2: Explain the concepts of Geometry by using basic definitions.
		CO3: Compute shortest distance and an angle between two lines
		CO4: Analyze the general equation of conic to its standard form .
		CO5: Estimate the condition of tangency for the Sphere .
		CO6: Create graph in 2- Dimension planes and lines using Maxima Software

Paper	Course code & course title	At the end of the course, student will be able to
II	Calculus-II (MT 122)	**CO1:** Identify basic terms in differential equation
		CO2: Describe the various methods of solving integration .
		CO3: Change non exact differential equation to exact differential equation
		CO4: Solve differential equation of first order and higher degree
		CO5: Evaluate differential equation with constant coefficient
		CO6: Construct orthogonal trajectory for a given curve of family.
III	Mathematics Practical (MT 113)	**CO1:** Understand the basic properties of translation and rotation
		CO2: Explain the various terms of Line, Planes, Sphere .
		CO3: Plot the graph of planes & lines
		CO4: Examine the properties of differential equation
		CO5: Evaluate the examples on Taylors series and Maclaurian series
		CO6: Generate graphs using Maxima Software

Class : S.Y.B.Sc.		
Semester-III		
Paper	**Course code & course title**	**At the end of the course, student will be able to**
I	Calculus of Several Variables MT 231	**CO1:** Define basic definitions in multivariable calculus.
		C02: Discuss limit and continuity in multivariable's.
		CO3: Compute basic examples related to partial derivatives.
		CO4: Estimate the properties of Euler's Theorem.
		CO5: Classify the concepts of Maxima and Minima.
		CO6: Plot graphs of multivariable functions using Maxima.
II	Numerical Methods and its Applications MT 232(A)	C01: Define basic definitions and formulas in numerical methods
		CO2: Describe numerical methods of solving first order ordinary differential equations
		CO3: Can apply Forward and Backward Interpolation formula
		CO4: Apply the Numerical Integration Formulae to calculate approximate area
		CO5: Evaluate basic results in Numerical Methods using Maxima Software
		CO6: Construct short numerical program using Maxima software
II	Graph Theory MT 232(B)	**C01:** Draw basic graphs
		C02: Interpret the isomorphism's in graphs
		C03: Calculate the shortest path
		C04: Examine the types of different graphs

		C05: Can interpret the Trees
		C06: Can gives applications of Graph Theory in AI and ML
III	Practical Based on MT 231 & 232(A)	**C01:** Draw level Curves in multivariable
		C02: Interpret the range and domain of multivariable functions
		C03: Calculate area and volume using Maxima Software
		C04: Examine the various types of errors using Maxima software
		C05: Evaluate algebraic and transcendental equations
		C06: Rewrite results in Numerical methods using Maxima Software

Semester-IV		
I	Linear Algebra MT 241	**C01:** Define basic concepts in linear algebra
		C02: Discuss the linear dependence and independence of vectors
		C03: Solve the examples on vector spaces
		C04: Examine the results in Inner Product Spaces
		C05: Evaluate the rank and nullity of vector spaces
		C06: Construct matrix of a linear transformation using Maxima software
II	Vector Calculus MT 242(A)	**C01:** Define the basic concepts in vector calculus
		C02: Discuss the Limits, Continuity and Differentiability.
		C03: Apply Greens Theorem in the plane.
		C04: Simply the results on volume and surface integral.
		C05: Evaluate directional derivatives and Gradient of curves.
		C06: Construct the results in Vector Calculus using Maxima Software
III	Practical Based on MT 241 & 242(A)	**C01**: Draw vectors in 2 and 3 dimensional space
		C02: Discuss the results in inner product spaces
		C03: Estimate Gram Schmidt process and its applications
		CO4 : Examine Gradient of a scalar point functions and its geometrical interpretation.
		C05: Evaluate Solenoideal and irrigational vector field.
		C06: Develop small programs using Maxima Software.

Paper	Course code & course title	At the end of the course, student will be able to
Class : T.Y.B.Sc		
Semester-V		
I	Metric Spaces (35111)	**CO1:** Define basic properties of Metric and its applications
		CO2: Discuss basic concepts of Metric Spaces.
		CO3: Classify various types of sets like open and closed.
		CO4: Distinguish between given metric spaces using various properties.
		CO5: Evaluate examples on compactness and connectedness.
		CO6: Think about arbitrary space in terms of metric spaces and modify the same
II	Real Analysis – I (35112)	**CO1:** Describe the algebraic properties of real numbers, types of sets and types of function
		CO2: Discuss the concept of sequences of real numbers.
		C03: Classification of sequences and series of real numbers in terms of convergence and divergence
		C04: Examine countable, uncountable sets, cantor sets using real life examples.
		C05: Evaluate examples on the sequences and series of real numbers.
		C06: Construct various types of sequences and series of real numbers
III	Group Theory (35113)	**CO1:** Define binary operations and concept of isomorphic binary operations
		CO2: Discuss various types of Groups as per the properties
		C03: Solve the examples of groups and permutation groups
		C04: Examine the concept of factor group and Simple Group
		CO5: Test for isomorphism of groups.
		C06: Important aspects regarding Fundamental theorem of algebra
IV	Ordinary Differential Equations (35114)	**CO1:** Define order and degree of ordinary differential equations.
		CO2: Discuss various methods on linear differential equation
		C03: Solve examples on linear differential equations.
		CO4: Examine the solutions of system of linear first order differential equations
		CO5: Evaluate the ordinary differential equation using series method
		CO6: Construct differential equation using real life problem
V	Operations Research (35115A)	**CO1:** Recall the basic definitions in operations research.
		CO2: Discuss various examples of operations research.
		CO3: Solve the various transportation problems
		CO4: Simplify Assignment problems

		CO5: Distinguish the Assignment and Transportation problems
		CO6: Classify and apply the concepts of operations research in real life
VI	Number Theory (35116B)	**CO1:** Describe basic properties of Numbers
		CO2: Explain various theorems on numbers towards finding remainder
		CO3: Solve examples on linear congruence relation
		CO4: Examine various types of quadratic equations
		CO5: Evaluate $d(n)$, $\sigma(n)$, $\omega(n)$, $\phi(n)$ and multiplicative functions
		CO6: Classify and apply the concepts of number theory in real life
VII	Practical Course Based on 35111& 35112 (35117)	**CO1:** Find various types of points in a set like interior, exterior and boundary points etc.
		CO2: Explain the continuity of functions between two metric spaces
		CO3: Apply various properties of metric spaces towards real life examples
		CO4: Indentify the properties of sequence and series of real numbers
		CO5: Evaluate examples on various test of convergence
		CO6: Rewrite the formulas of sequence and series of real numbers
VIII	Practical Course Based on 35113 & 35114 (35118)	**C01:** Identify the types of groups.
		C02: Explain the order of an element and group
		C03: Analyze difference between various groups
		CO4: Discuss problems on ordinary differential equations
		CO5: Distinguish linear and Non linear differential eqautions
		CO6: Construct some problems on differential equations
IX	Practical based on Paper 35115(A) & 35116(B) (35119)	**C01:** Solve LPP using various method.
		C02: Explain various methods of operations research.
		C03: Solve the problems on transportation and assignment
		CO4: Understand the concept of resuidue system
		CO5: Evaluate examples on residue classes
		CO6: Exaplain the various symbol and its properties
X	Programming in Python - I 351110	**C01:** Installing Python software
		C02: Writing Basics in Python
		C03: Can write equations in Python
		CO4: Understand the concept Python
		CO5: Evaluate examples and programmes in Python
		CO6: Exaplain the various symbol and its properties in Python

Paper	Course code & course title	At the end of the course, student will be able to
XI	LaTeX for Scientific Witting 351111	**C01:** Can install LaTeX
		C02: Explain various notations in LaTeX
		C03: Can write equations in LaTeX
		CO4: Understand the concept LaTeX
		CO5: Evaluate examples
		CO6: Can insert Picture in LaTeX

<div align="center">Semester-VI</div>

Paper	Course code & course title	At the end of the course, student will be able to
I	Complex Analysis (36111)	**CO1:** Define various properties complex number
		CO2: Discuss limit, continuity derivative properties of complex valued functions.
		CO3: Solve various examples of complex valued functions.
		CO4: Simplify the integrals of complex valued functions
		CO5: Evaluate the convergence of sequence and series of complex valued functions
		CO6: Generate zeroes of analytic function, trigonometric function, hyperbolic function
II	Real Analysis-II (36112)	**CO1:** Describe the algebraic properties of real valued functions, types of sets and types of function
		CO2: Discuss the concept of sequences of real valued functions.
		C03: Classification of sequences and series of real valued functions in terms of convergence and divergence
		C04: Examine countable, uncountable sets, cantor sets using real life examples.
		C05: Evaluate examples on the sequences and series of real valued functions
		C06: Construct various types of sequences and series of real valued functions
IV	Ring Theory (36113)	**CO1:** Define binary operations and concept of isomorphic binary operations
		CO2: Discuss various types of Rings as per the properties
		C03: Solve the examples of rings
		C04: Examine the concept of factor ring
		CO5: Test for isomorphism of rings.
		C06: Important aspects regarding UFD , PID
V		**CO1:** Define the concepts of ordinary differential equations in more than two variables

	Partial Differential Equations (36114)	**CO2**: Illustrate theorems in ordinary differential equations in more than two variables
		CO3: Apply various methods for solving Partial differential equations including two or three independent variables.
		CO4: Distinguish between Jacobi's, Charpit's method
		CO5: Evaluate examples on integral surface and orthogonal surfaces
		CO6: Construct Partial Differential Equations using given curves and surfaces
VII	Optimization Techniques 36115A	**C01** : Describe the importance of graph theory concepts , defination and important aspects.
		C02: Discuss wheather or not two graphs are isomorphic or not.
		CO3: Solve various search algorithm, sorting algorithm and greedy algorithm works
		CO4 : Draw various types of graphs
		C05: Evaluate the shortest the shortest distance in graphs .
		CO6: Make various algorithms on graphs
VIII	Computational Geometry 36116B	**CO1:** Define Representation of points transformation
		CO2: Discuss Types of projections, different curves, plane curves, solid body transformation etc.
		CO3: Explain transformation of intersecting lines, three dimensional transformations, multiple transformations, plane curves, Bezier Curves etc.
		CO4: Solve parametric and non parametric representation of curves
		CO5: Illustarte properties of space curves, curve fitting, equation of curves in matrix form
		CO6: Analyze affine and perspective projection oblique projection , orthographic projection etc.
III	Practical Course Based on 36111& 36112 (36117)	**CO1:** Draw various types real valued functions
		CO2: Discuss Point wise and uniform convergence of sequences of functions
		CO3: Calculate contour integration
		CO4: Distinguish proper and improper integrals
		CO5: Evaluate the convergence of Improper integrals
		CO6 : Rewrite the results on Riemann integration
VI		**CO1:** Describe the various concepts of rings
		CO2: Calculate factor rings, prime ideals, maximum ideals, multiplicative norms etc.

	Practical Course Based on 36113& 36114 (36118)	**CO3:**Explain Unique factorization domain, Euclidean domain, Integral Domain, etc.
		CO4: Understand Orthogonal trajectories, pfaffian differential equation, quasi linear equation, etc.
		CO5: Calculate the examples of Jacobi's method, Charpits method, Integral surfaces through a given curve etc.
		CO6: Exaplain nth order partial differential equation, variable separable method , compatible system etc.
IX	Practical Course Based on 36115A & 36116B (36119)	**CO1:** Draw various types of graphs
		CO2: Plot various Trees
		CO3: Design shortest path algorithm of graphs
		CO4: Discuss the applications of transformations to real life problems
		CO5: Analyze the examples on scaling, translation, shearing in 2D and 3D
		CO6: Construct various technique for generating perspective views.
X	Programming in Python - II 361110	**C01:** Installing Python software
		C02: Writing Basics in Python
		C03: Can write equations in Python
		CO4: Understand the concepts in Python
		CO5: Evaluate examples and programmes in Python
		CO6:Exaplain the various matrices and its properties in Python
XI	Mathematics in to LaTeX 361111	**C01:**Can rewrite the codes in LaTeX
		C02: Explain various notations in LaTeX
		C03: Can write equations in LaTeX
		CO4: Understand the concept in LaTeX
		CO5: Evaluate examples
		CO6:Can insert Tables in LaTeX